Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Hart Mine Marsh

2014 Annual Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

June 2018

Work conducted under LCR MSCP Work Task E9

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

Bureau of Reclamation
U.S. Fish and Wildlife Service
National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

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Arizona Game and Fish Department
Arizona Power Authority
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City of Lake Havasu City
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Mohave Water Conservation District
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Other Interested Parties Participant Group

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ACRONYMS AND ABBREVIATIONS

cfs	cubic feet per second
Cibola NWR	Cibola National Wildlife Refuge
FY	fiscal year
HMM	Hart Mine Marsh
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
NGVD27	National Geodetic Vertical Datum of 1927
pH	the acidity or basicity (alkalinity) of an aqueous solution
Reclamation	Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service

Symbols

<	less than
%	percent

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1.0 INTRODUCTION

The purpose of this annual report is to summarize all activities that have occurred at Hart Mine Marsh (HMM) from October 1, 2013, through September 30, 2014, which is Federal fiscal year (FY) 2014, and projected activities for FY15. Water usage is presented for the calendar year, January 1 through December 31, 2014, consistent with water accounting reporting.

1.1 Background

The Cibola National Wildlife Refuge (Cibola NWR) consists of about 16,600 acres of land located along approximately 12 miles of the lower Colorado River in Arizona and California. It was established in 1964 as a refuge and breeding ground for migratory birds and other wildlife. The refuge is divided into six management units: Unit 1, Unit 2, Unit 3, Unit 4, Unit 5, and Unit 6. The Hart Mine Marsh Management Unit is part of Unit 2 (see figure 2).

The Hart Mine Marsh Management Unit is a subunit of Unit 2, located on the southern end of the Cibola NWR in Arizona. The management unit encompasses approximately 646 acres, with approximately 523 acres that have wetland development potential and classify as "wetlands" according to the U.S. Army Corps of Engineers guidelines for wetland delineation with the Arid West supplement. Approximately 255 acres within this area now make up HMM.

HMM was a decadent wetland on the U.S. Fish and Wildlife Service's (USFWS) Cibola NWR. The channelization of the lower Colorado River in the vicinity of HMM caused a drop in the water table, and the marsh became disconnected from the former flood plain. The river's hydrograph has been altered so that it no longer has large, dynamic overbank flow events that would have likely created and maintained HMM. Subsequently, the marsh was reduced to a much smaller area of open water and emergent vegetation (approximately 20 acres). The surrounding areas were colonized primarily by saltcedar (*Tamarix* spp.), an invasive, non-native species. For years, the remaining marsh was characterized by poor water quality, marginal wetland/marsh habitat, and saline soils, which included some areas completely devoid of vegetation. In addition, the design of the marsh's infrastructure and the way it was managed may have contributed to its decadent state by increasing concentrations of salinity and nitrogen.

Surface water inputs to HMM after the channelization of the lower Colorado River were supplied from three main sources: Arnett (drainage) Ditch, the refuge's Unit 2 irrigation ditch, and tributary inflows from adjacent alluvial fans. During this period of management, the surface water hydrology of the marsh was highly dependent upon irrigation practices in adjacent farming areas and episodic

precipitation events in the uplands. Additionally, all three surface water sources terminated in the marsh, with only limited surface water outflows (Hautzinger et al. 2007).

Prior to restoration activities, there was little existing marsh cover type (open water and emergent vegetation) occupying this site. The majority of the site (80%) was dominated by various classes of saltcedar associations. A portion of the 646 acres defined as the Hart Mine Marsh Management Unit was selected for establishment as a Lower Colorado River Multi-Species Conservation Program (LCR MSCP) conservation area. This area now comprises approximately 255 acres designated as HMM.

HMM was identified as a site with potential for marsh habitat restoration by the USFWS and Bureau of Reclamation (Reclamation) before implementation of the LCR MSCP. The USFWS's Lower Colorado River Refuges Comprehensive Management Plan and Ecological Assessment also targeted HMM as a restoration priority (USFWS 1993). In the mid-1990s, a number of improvements were made, which included the extension of Arnett Ditch past the Hart Mine Marsh Management Unit with the installation of a controlled outflow through the tie-back levee and a series of control structures along this ditch extension. These control structures were designed to allow for drain water from Arnett Ditch to be diverted into the Hart Mine Marsh Management Unit.

With the authorization of the LCR MSCP and the mutual desire for the USFWS and Reclamation to restore HMM, a partnership between the two agencies was formed. As part of the planning effort for the restoration partnership at HMM, the USFWS hosted a Wetland Review at the Cibola NWR. The participants in the review prepared a draft document that included a number of desired features and approaches for restoration of the site – many of which could be incorporated into a restoration design (these are discussed in more detail in the Hart Mine Marsh Restoration Development and Monitoring Plan [LCR MSCP 2009]). Using baseline information gathered and complied by the USFWS in the Hart Mine Marsh – Existing Conditions Report (Hautzinger et al. 2007) and guided in part by the wetland review process, Reclamation developed an appropriate engineering design and approach that was intended to fulfill both the needs of the Cibola NWR and those of the LCR MSCP.

2.0 CONSERVATION AREA INFORMATION

2.1 Purpose

The purpose of this project is to restore portions of HMM to functional marsh habitats that support species covered under the LCR MSCP, specifically Yuma clapper rails (*Rallus longirostris yumanensis* [also known as Yuma Ridgway's

rail = *R. obsoletus yumanensis*]) western least bitterns (*Ixobrychus exilis hesperis*), and Colorado River cotton rats (*Sigmodon arizonae plenus*). It is likely that the creation of a mosaic of marsh habitat will also benefit a host of other species, including California black rails (*Laterallus jamaicensis coturniculus*), as well as other wading birds and migratory waterfowl.

2.2 Location

HMM consists of approximately 255 acres on the Cibola NWR, located in Reach 4 near Cibola, Arizona. It is within the historic flood plain of the lower Colorado River and between River Miles 90 and 93 on the Arizona side (figures 1, 2, and 3).

2.3 Landownership

The property is owned by the USFWS, who will dedicate land and water to Reclamation to develop and maintain native land cover types for the LCR MSCP. The property is managed by the USFWS.

2.4 Water

The Cibola NWR has 2nd priority water rights, which include a diversionary entitlement of 27,000 acre-feet per year and a consumptive use entitlement (diversion minus return flow) of 16,793 acre-feet per year. In addition, the refuge has a circulatory (circulation water with minimum consumptive use) water right of 7,500 acre-feet per year. HMM will have an average of 1,258 acre-feet per year (7.23 acre-feet per acre, per year) available when the conservation area has been fully developed.

2.5 Agreements

A Land Use Agreement for general restoration activities on the Cibola NWR has been executed and is on file. Attachment (2) to Exhibit B of the aforementioned Land Use Agreement, which specifies the activities at HMM, has been finalized, which secured the land and water resources at the marsh for the 50-year term of the LCR MSCP.

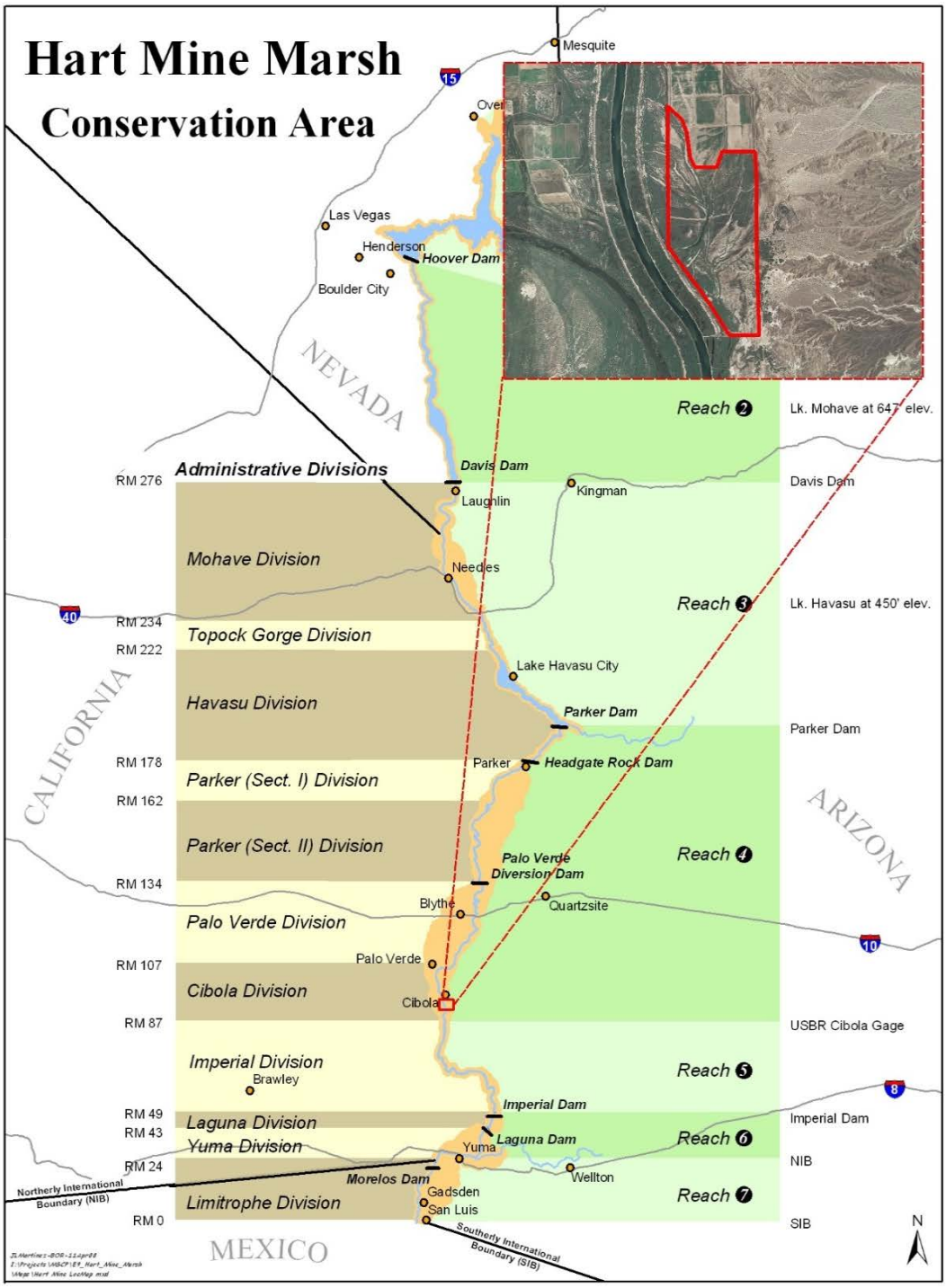

Figure 1.—General location of HMM.

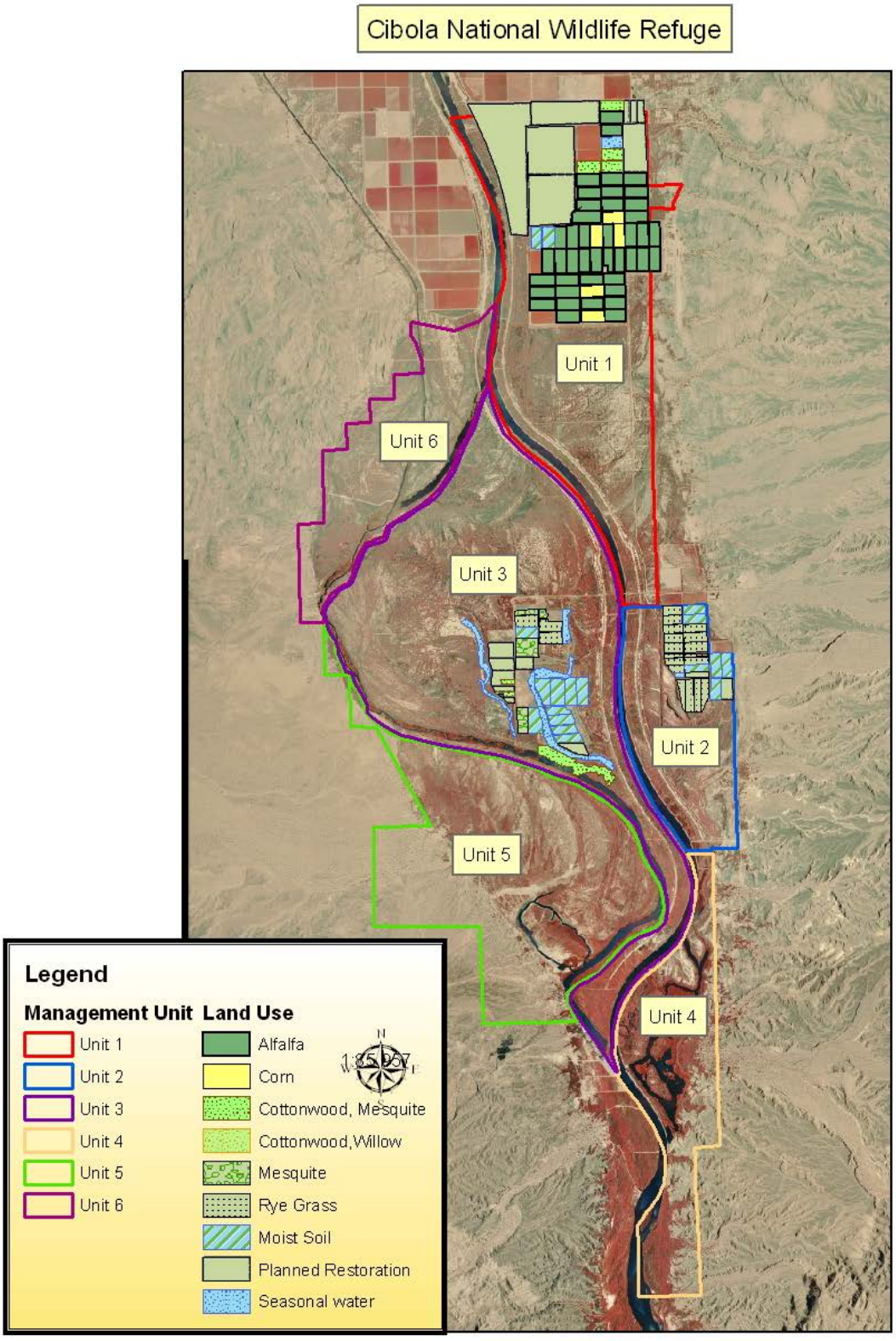

Figure 2.—Management units of the Cibola NWR.

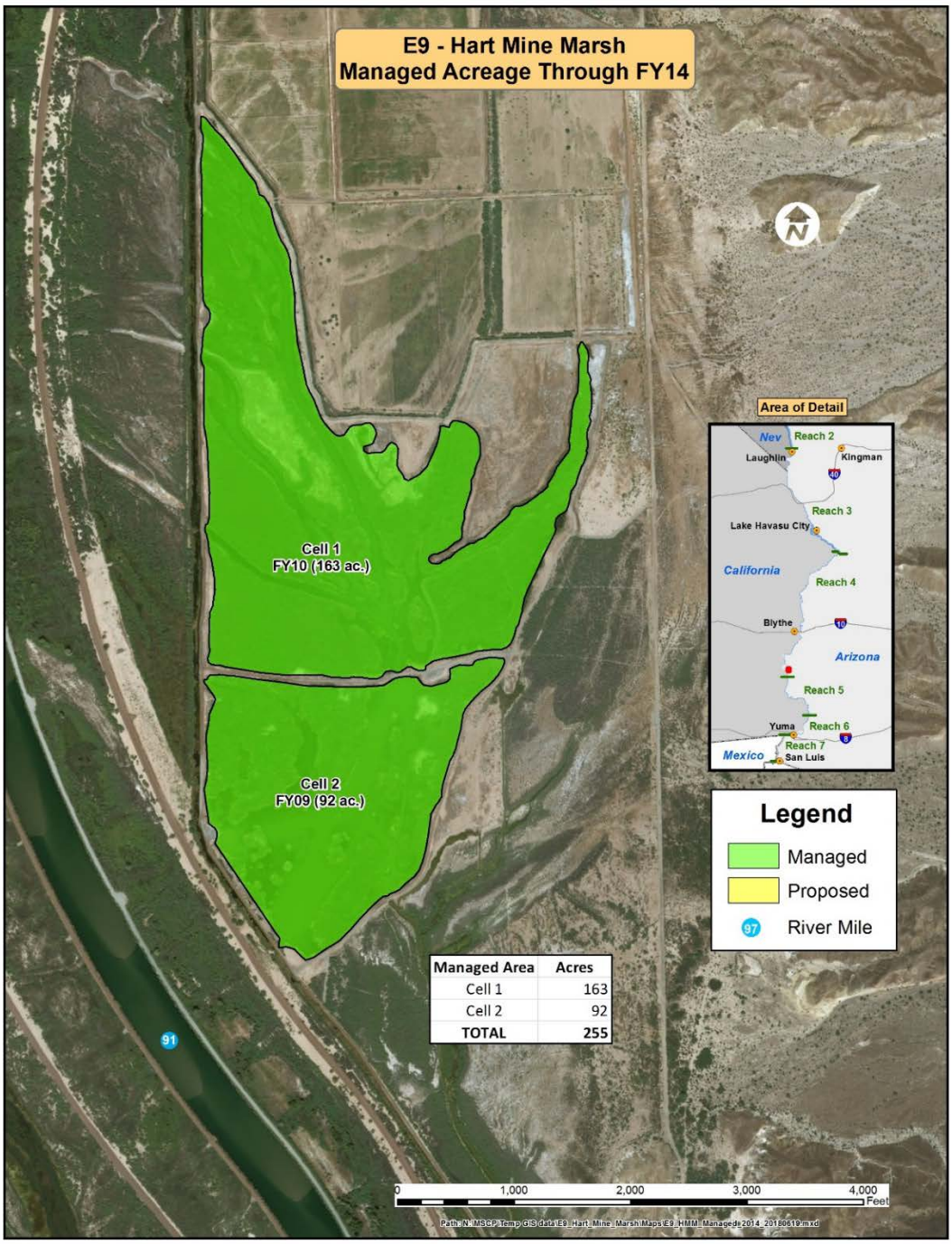

Figure 3.—HMM managed acres through FY14.

2.6 Public Use

Public use on HMM is managed by the USFWS. In cooperation with Reclamation, the USFWS coordinates its public use and related activities so they are compatible with management of the site for the LCR MSCP. Duck hunting is permitted at HMM from 10 a.m. to 3 p.m. during the Arizona State waterfowl season. Other low-impact public uses such, as wildlife watching, sport fishing, and education/outreach, are expected at HMM. However, these uses may be regulated depending on future occupation of listed species.

2.7 Law Enforcement

Law enforcement activities are performed primarily by the USFWS's Law Enforcement Officer, under the LCR MSCP's site-specific Fire Management & Law Enforcement Strategy (LCR MSCP 2010). Additional local law enforcement assistance is available through the La Paz County Sherrif's Office and the Bureau of Land Management's Yuma Field Office.

2.8 Wildfire Management

The USFWS will provide an appropriate management response to all wildfires that occur within the Cibola NWR. The full range of suppression strategies is available to managers provided that selected options do not compromise firefighter/public safety or cost effectiveness while protecting wildlife habitat (LCR MSCP 2010).

3.0 HABITAT DEVELOPMENT AND MANAGEMENT

3.1 Planting

No additional planting occurred at HMM in 2014.

3.2 Irrigation

Operation and management of HMM primarily relates to the control, manipulation, and management of water on the site. Cells 1 and 2 can be operated independently in terms of surface elevations and inlets and outlets. This is accomplished through a series of gated and/or stoplog-type controls structures

located on Arnett Ditch and between the cells. HMM is supplied with water from Arnett Ditch through a series of control structures and by using gravity flow through the marsh cells. Currently, this source of water in Arnett Ditch can also be supplemented with Colorado River water by using the Unit 2 pumps and infrastructure. To provide water for HMM using a source other than the ditch (drain water), the conservation area relies on the water conveyance infrastructure associated with the refuge's Unit 2 management area. This infrastructure includes two electric pumps and a series of buried pipe and concrete-lined supply canals, which is shared by the refuge, contract farmers, adjacent private landowners, and HMM. Currently, the LCR MSCP shares the electrical costs of pumping water through this infrastructure and may also share in the cost of maintenance and repair to the system, as is stated in the existing Land Use Agreement. Since the completion of Phase 3, Colorado River water, unmixed with drain water from Arnett Ditch, will be able to be supplied to HMM using the Unit 2 delivery canals.

The outlet works for HMM also allow for flexibility in where the water exiting the marsh and Arnett Ditch can be discharged. Water draining from the marsh and ditch can be routed through Cibola Lake or directly back to the Colorado River through a pair of gated control structures located along Arnett Ditch south of HMM.

3.3 Site Management

Since one of the targeted species for HMM is the Yuma clapper rail, water elevations will be strictly controlled in Cells 1 and 2. Elevations will be managed in a static condition prior to and during the breeding season for this species. These water surface elevations will be held relatively constant from about March 1 through August 31. The projected managed elevations are 217 and 216.5 feet (NGVD27) for Cells 1 and 2, respectively.

The management goal for the marsh is 217 feet elevation for the benefit of LCR MSCP covered species in Cell 1. Using the available 20-cubic-foot-per-second (cfs) pump, the Cibola NWR was able to supplement Arnett Ditch to compensate for high evapotranspiration loss and maintain water levels within 0.2 inch throughout the Yuma clapper rail breeding season. In August 2013, the new HMM 40-cfs pump failed due to sedimentation around the pump intake, which caused the pump shaft to break and damage to the motor. This required Reclamation/LCR MSCP to remove, rebuild, and reinstall the 40-cfs pump/motor as quickly as possible to prevent the water level in the marsh from falling below the required water level threshold for a successful marsh habitat. This reinstallation was completed in September 2013, and the 40-cfs pump is continuing to work properly at this time. However, the LCR MSCP and Cibola NWR continue to be concerned about future sandbars/sedimentation

from the Colorado River infiltrating both (20 and 40 cfs) pump intakes and damaging the pumps and motors. The Cibola NWR Unit 2, 20-cfs pump has also suffered damage from the intake of river sedimentation and has been removed for repairs and reinstallation by the USFWS and the farmer in FY14.

Based on past observations, it is doubtful that Cell 2 will be able to be managed at its target design elevation of 216.5 feet. At elevation 216.5 feet, a large portion of Cell 2 would be exposed, increasing weed management intensity. In addition, much of the established habitat would be left without standing water, resulting in the death of much of the planted marsh vegetation. The LCR MSCP expects that a target depth of 216.8 feet may be more practical for sustaining established marsh habitat in Cell 2 and for maximizing ideal water depths.

Management at HMM also includes the management of water quality parameters. Most of these parameters have not been problematic to date, with the exception of rising salinities throughout the summer months. This has been effectively controlled through regular pumping of Colorado River water into the marsh via Arnett Ditch. Although there appears to be a lag before salinities fall, this method has been able to keep salinities below marsh thresholds (figures 4–6). Additional future water management actions to control salinities and long-term salinization may also include the dewatering and flushing (refilling with Colorado River water) of Cells 1 and 2. This would also occur outside of the breeding season for Yuma clapper rails and would likely be conducted for one cell at a time in order to allow some flooded habitats to remain for resident Yuma clapper rails and other species during this management activity.

Long-term management activities may also include the removal of decadent emergent vegetation to improve habitat for Yuma clapper rails. This is expected to be conducted one cell at a time, with a longer interval between vegetation removals at each cell to maintain usable emergent marsh habitats. Vegetation removal may be accomplished through controlled burning or by mechanical means. This management action is expected to be driven and supported by data from monitoring activities or past relevant research and prescribed using the adaptive management process of the LCR MSCP. An adaptive management plan for the site has been drafted and is currently in review.

The majority of maintenance on the site is expected to be controlling invasive and non-native species invasion. Currently, the majority of this work is being performed through contracted services. This has been accomplished by frequent site visits to assess the occupation and spread of weedy species followed by control actions, if necessary. Control is performed using crews that employ hand-pulling of weeds, mechanical removal techniques, and through using limited herbicide treatments, when appropriate. The area that this contract covers includes the perimeter of the entire marsh complex from the wetted edge of the marsh to the tops of the perimeter road surrounding the marsh. The Cibola NWR

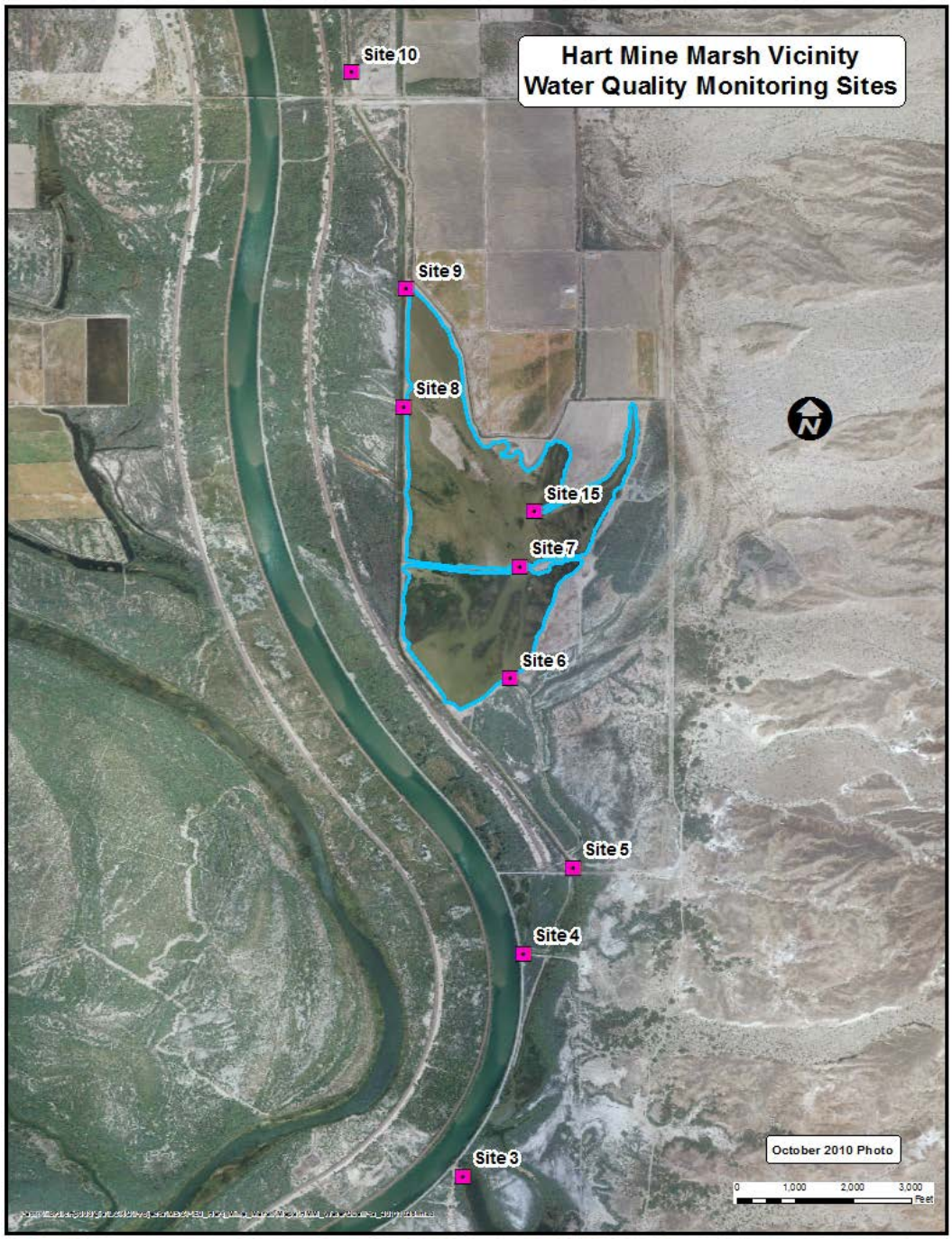

Figure 4.—HMM water quality monitoring locations.

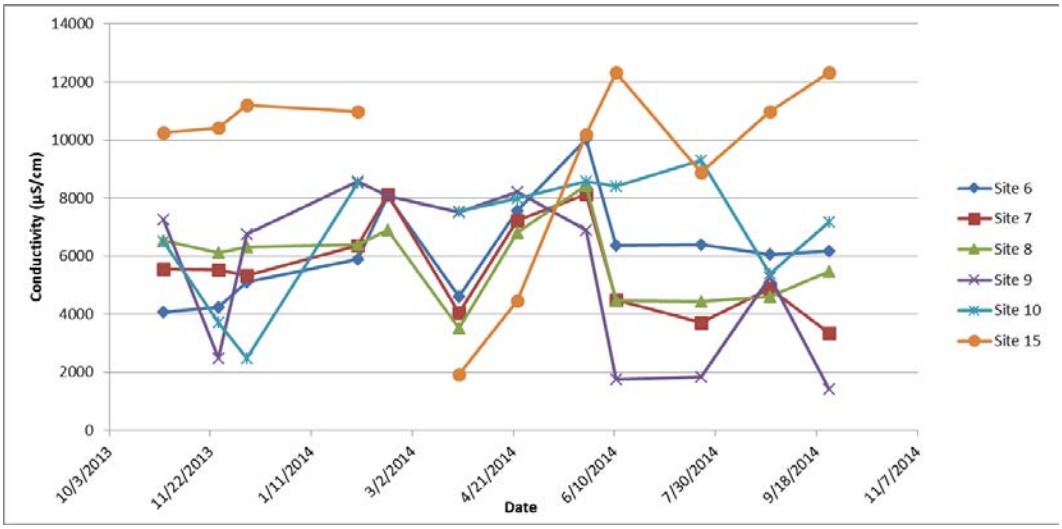

Figure 5—HMM specific conductivity, FY14.

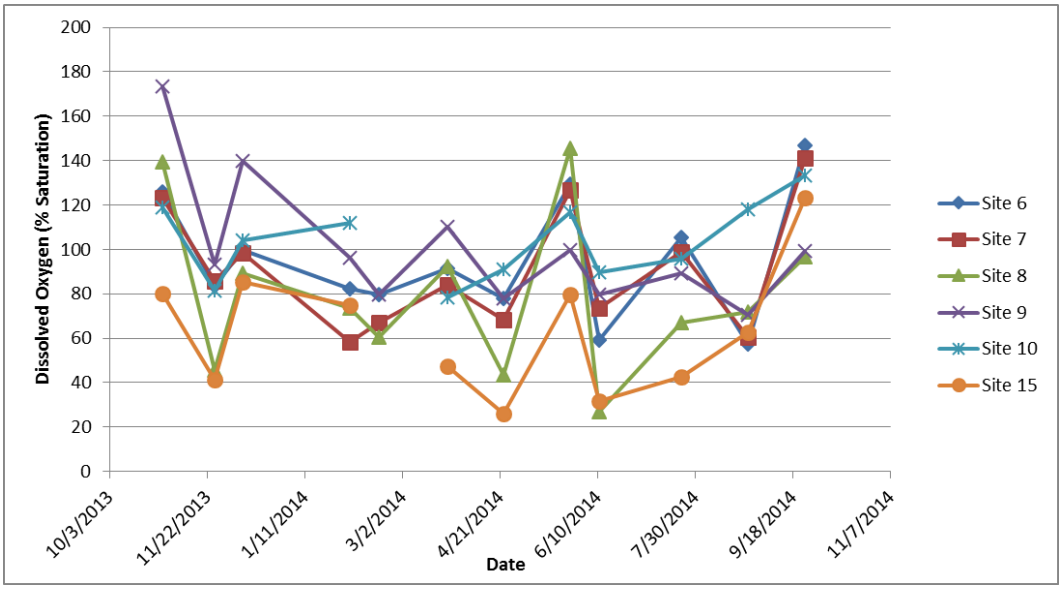

Figure 6.—HMM dissolved oxygen, FY14.

is responsible for the adjacent areas outside HMM. Other site maintenance includes the upkeep of access roads and the water delivery infrastructure. Access roads specific to HMM will be maintained by the LCR MSCP.

3.4 Major Construction

No major infrastructure repair activities were conducted in FY14.

4.0 MONITORING

4.1 Abiotic Monitoring

The USFWS is responsible for monitoring and reporting on many abiotic parameters of the site as part of the interagency agreement with Reclamation. The Cibola NWR continued monthly water quality monitoring at specific points throughout the marsh. Water quality parameters, including pH, dissolved oxygen, and specific conductivity (as a measurement of total salinity), were measured throughout the fiscal year. Figure 4 shows the locations (sites) where water quality parameters are measured and collected in the vicinity of HMM.

In general, water quality varied from site to site and across seasons. Since very high salinities can affect vegetation and, in turn, impact wildlife species, management activities at this time only targeted specific conductivity. Salinities were effectively controlled by pumping Colorado River water into HMM via Arnett Ditch. Figure 5 illustrates the variation in specific conductivity throughout the year and shows the drop in salinities at each site when management action (February pumping, flushing, and refilling) has occurred. Figure 6 depicts the values for dissolved oxygen, and figure 7 shows the pH at each sampling site and the fluctuations in water quality between these sampling intervals. A complete water quality dataset for the fiscal year is available upon request.

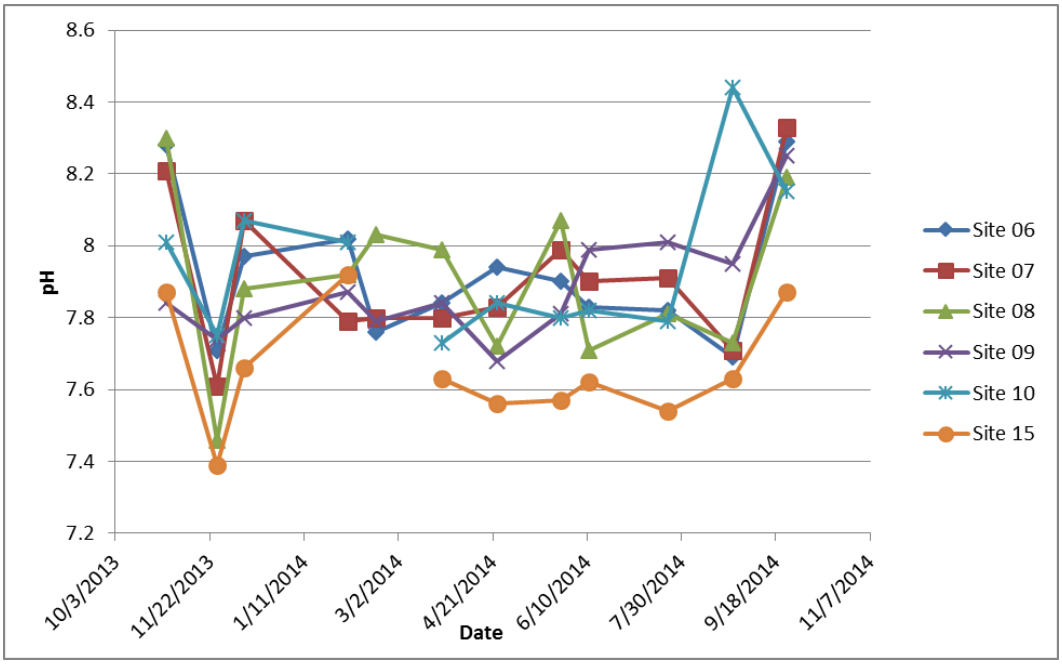

Figure 7.—HMM pH, FY14.

4.2 Avian Monitoring

4.2.1 Marsh Bird Surveys

Presence surveys for California black rails, western least bitterns, Virginia rails (*Rallus limicola*), and Yuma clapper rails were conducted in marsh habitat at the HMM during four different surveys between March and May. Western least bitterns were detected during all four surveys at eight of the survey points. Yuma clapper rails were detected during all four survey periods at five of the survey points. California black rails were detected for the first time at HMM during the last survey period on May 15 (Ronning and Kahl 2017).

4.3. MacNeill's Sootywing Skipper Monitoring

MacNeill's sootywing skippers *(Pholisora gracielae = Hesperopsis gracielae* [MacNeill]) were surveyed between May and August at five randomly selected shrubs on the edge of HMM. Adults were detected in May and August, and larvae were detected in July (Nelson et al., *in press*).

5.0 HABITAT CREATION CONSERVATION MEASURE ACCOMPLISHMENT

5.1 Vegetation Monitoring

Vegetation monitoring is not conducted for marshes; rather, remote sensing and ArcGIS techniques will be used to assist in the evaluation of HMM.

5.2 Evaluation of Conservation Area Habitat

The Final Habitat Creation Conservation Measure Accomplishment Tracking Process was finalized in October 2011 (LCR MSCP 2011). All areas within HMM were designed to benefit covered species at the landscape level. The water depths are managed during the breeding season for Yuma clapper rails and to meet the species conservation measure as defined in the Habitat Conservation Plan.

In 2014, the percent of open water and marsh was delineated using aerial imagery in ArcGIS. The marsh continues to fill in the open water as expected by design.

To meet species habitat creation requirements, the Habitat Conservation Plan provides goals for habitat creation based on land cover types. Four species with habitat creation goals have creditable acres at HMM. These species, including

their corresponding conservation measure acronyms, are: Yuma clapper rail (CLRA1), California black rail (BLRA1), least bittern (LEBI1) and Colorado River cotton rat (CRCR2) (table 1).

Table 1.—Species-specific habitat creation conservation measure creditable total acres for 2014

Species-specific habitat creation conservation measure	CLRA1	BLRA1	LEBI1	CRCR2
Creditable acres in 2014	0	0[1]	0	255
Total, including previous years	255	0	255	255

[1] Reclamation is in the process of determining the land and water interface and the method for delineating California black rail marsh habitat at <1 inch. Once this has been determined, HMM will be evaluated.

6.0 ADAPTIVE MANAGEMENT RECOMMENDATIONS

Adaptive management relies on the initial receipt of new information, the analysis of that information, and the incorporation of the new information into the design and/or direction of future project work (LCR MSCP 2007). The Adaptive Management Program's role is to ensure habitat creation sites are biologically effective and fulfill the conservation measures outlined in the Habitat Conservation Plan for 26 covered species and if they potentially benefit 5 evaluation species. Post-development monitoring and species research results will be used to adaptively manage habitat creation sites after initial implementation. Once monitoring data are collected over a few years, and then analyzed for HMM, recommendations may be made through the adaptive management process for site improvements in the future.

There are no adaptive management recommendations for HMM at this time.

LITERATURE CITED

Hautzinger, A., D. Kundargi, and P. Donnelly. 2007. Hart Mine Marsh – Existing Conditions Report. U.S. Fish and Wildlife Service, National Wildlife Refuge System, Region 2. April 30, 2007.

Lower Colorado River Multi-Species Conservation Program (LCR MSCP). 2007. Final Science Strategy. Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada.

_____. 2009. Hart Mine Marsh Restoration Development and Monitoring Plan, 2009. Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada.

_____. 2010. Lower Colorado River Multi-Species Conservation Program Fire Management & Law Enforcement Strategy. Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada.

_____. 2011. Final Habitat Creation Conservation Measure Accomplishment Tracking Process. Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada.

Nelson, S.M., R. Wydoski and J. Keele. *In press*. Monitoring MacNeill's Sootywing (*Hesperopsis gracielae*) and its Habitats, 2014 Annual Report. Annual report submitted to the Bureau of Reclamation, Boulder City, Nevada, by the Bureau of Reclamation Ecological Research and Investigations Group, Technical Services Center, Denver, Colorado.

Ronning, C.J. and J. Kahl. 2017. Marsh Bird Surveys at Conservation Areas, 2014–2016 Annual Report. Lower Colorado River Multi-Species Conservation Program, Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada.

U.S. Fish and Wildlife Service (USFWS). 1993. Lower Colorado River Refuges Comprehensive Management Plan and Ecological Assessment.